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ESSAY

ON THE

ABSORBENT VESSELS;

SHEWING

THAT THEIR ACTION IS NOT LIABLE TO BE INFLUENCED
BY THE ARTIFICIAL AGENTS COMMONLY APPLIED.

BY

HENRY SEARLE,
SURGEON, LONDON

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AN ESSAY
ON
THE ACTION
OF THE
ABSORBENT VESSELS.



THE Absorbent Vessels, according to the opinions generally entertained respecting their function, ought to be organized differently from all other structures which are subject to physical laws: since their office is affected alike by every species of agency; whether congenial or injurious; whether consistent or not with mechanics and hydraulics; whether similar in their mode of operation to what is known in other organ-

ized parts, or directly the contrary. In conformity with this opinion debilitating means are sometimes employed ; such as nauseating medicines, mercurials, digitalis, &c. At others strengthening and stimulating means ; such as friction, blisters, spirituous and balsamic applications, electricity, and pressure, all which are used with the intention of producing the same effect : increased absorption. But is it not inconsistent with reason to expect that agents so opposite in their nature should influence any piece of mechanism, whether animal or inert, to accomplish the same result. For if one set of agents occasion an increase of power in the absorbents, the other should be productive of a different effect, a diminished action of those vessels.

There are no means allowed to have been discovered capable of obtaining the latter effect, which is an insulated circumstance peculiar to the lymphatic system. It is

suggested that, if the prevalent notions of influencing the absorbent vessels by medicine were correct, muscular fibre would be essential to the augmentation of their functional power by stimulants; while, on the contrary, it would be impossible that sedative and debilitating agents should also increase the action of organs of such a structure; and that since in their operation they balance the extreme arterial vessels, which deposite the interstitial substance of all the solids under a natural degree of stimulus, as in health: why should they not, if they were muscular, maintain that equilibrium under different powers of stimulus; instead of which, in inflammation, it is destroyed in favor of the arteries, and, to appearance, even a contrary effect is produced.

It is, therefore, submitted to the consideration of the faculty, whether the following views of the subject would not afford a more satisfactory explanation.

That the lymphatics, during their organic preservation, are not susceptible of the influence of any agent which will increase or diminish their function, that their action is uniform or unvarying, and that an augmented or diminished action of the secretory organs does alone accomplish all the changes usually ascribed to the absorbing vessels: that the latter are as delicate as tubes can be conceived to be; but, since their fabric must be stronger as their size diminishes, they cannot easily be made to collapse, and are too minute to suffer compression unless by hard angular bodies; that their action depends upon the adaptation of fluids, in a favorable state, to their mouths, whether it be performed by capillary attraction or in any other way.

Thus, the lymphatics, without any augmentation of their own power, are sometimes allowed to absorb more, as when an abscess

is constantly supplying their mouths with a fluid suited to their capacity, a circumstance not attending interstitial absorption.

In health there is a counterpoise between deposition and absorption; the latter office is at an uniform standard: excepting, during growth, the former slightly overbalances.

In disease, as in inflammation, there is an increase of deposition; but in ulceration, absorption, although unaltered in its power, is greater than the secretion of the part, either from debility of the arterial branches concerned, or from mechanical obstruction to their contents by pressure; that from debility may be illustrated by recurring to an ulcer on the leg in old or feeble constitutions: how difficult it is to bring on a granulating process, and if accomplished by affording local and not general vigor, the granulations will, after a lapse of twelve or twenty-four hours, have become absorbed and disappeared,

not from an augmented action of the lymphatics; but from the arterial branches returning to their degenerate state, in consequence of the deficient power of the frame to support a circulation of blood which would nourish these granulations.

In sloughing, it is unnecessary that there should be an increase of absorption, there is an evident want of nervous energy in all parts thus attacked, and, consequently, a lessened secretion, and interstitial deposition of the solids: while the absorbents, performing their office uniformly, soon insulate the part which is losing its vitality.

The means generally employed to promote absorption are of two classes: both of which influence the secreting, but not the absorbing, organs.

1^{mo}. All those of a debilitating nature which have been before enumerated, are beneficial only, when the substance or fluid to

be dispersed is the effect of an increased power of action in the arteries; as in inflammation; not by accelerating the absorption of the effused lymph, pus, or serum: but, by checking their further production, in diminishing, or removing altogether their cause, inflammation, having brought the secerning vessels into a state of debility. Thus, a large abscess occasionally disappearing in the course of two or three days: which forms the strongest objection that can be made to the opinion of the absorbents never being influenced artificially, admits of an easy explanation. It frequently occurs, after an abscess of considerable magnitude has been liberated of its contents, and a plug introduced, that, on the following day, when the tent is removed, a further purulent collection will be found of nearly half the former quantity: which amply proves how remarkably copious is the daily secretion; and as it is very com-

mon for the tumor to remain of the same capacity for several days previous to its being opened : it follows that in all such cases, the absorption is not much less than the secretion. It is not difficult, under this view, to conceive of persons whose constitutions shall become sufficiently influenced by medicine, to have the action of the arterial system so reduced, that no part of it shall be capable of secreting pus, while the extensive surface of the abscess would soon absorb its contents. This might be accomplished more often than it is, were means used more frequently for this purpose.

2^{do}. The various applications of the stimulating class, used to excite the absorbents to greater action, merely operate by counter-irritation, determining the blood more superficially, at the expence of that which would have nourished the diseased parts internally.

If these organs were liable to be quickened in their operation, it would be rational

to expect that they would sometimes be found tardy; but Dr. Parry has clearly proved that serous effusion is the result of inflammatory action, not defective absorption. It is evidently so in hydrothorax occasioned by pleurisy, and other complaints of the chest, also, in hydrocephalus, hydrops pericardii, in blisters, and in all vesicular diseases. Frequently, serous effusion appears to arise from extreme relaxation of the secerning vessels; but there is no evidence of defective absorption.

ULCERATION.

There are two descriptions of ulceration:

One, Superficial, affecting the skin first, and gradually becoming deeper: either originating from the external application of severe pressure, or of irritable matter: or from debility, witnessed in the spontaneous recurrence of old sores.

The other, deeply seated, terminating superficially, and, in general, externally; but always arising from internal pressure: the *modus operandi* of which, will be better understood after an enquiry has been made into the various effects of pressure, when connected with the animal economy, upon the human frame.

Pressure is often used to accelerate absorption, and it is well known to have two effects, in opposition to each other.

Moderate pressure affords support, and gently invigorates the action of the arteries, under its influence, and if carried a little further, it produces a slight degree of inflammation, with the deposition of lymph thickening the part pressed. On the contrary, great pressure applied to a small surface occasions ulceration; and, if extensively, as the tightly bandaging a limb, extenuation. Are not the latter effects atchieved by mechanically obstructing, to a certain extent, the circulation of the blood through those arteries which would have afforded the due nourishment to the parts, rather than an augmented action of the absorbents immediately resulting from pressure?

In order to have a more correct idea of the influence of pressure, let it be considered, that the conformation of the human body is an imperfect globe, and differently sized imperfect cylinders, all of which are hollow

organs. It will be necessary to arrange them into two classes:—

One, including the Head and the Trunk, being the globe and largest cylinder, each having a large cavity, and containing soft and yielding substance: the viscera.

The other, including all the Limbs, being cylinders, whose cavities are small, and containing hard and unyielding substance: bone.

Each of these cylinders, as well as the globe, may be esteemed a series of others, encasing each other successively, the external of which is the integument, a strong and dense investment, whose office is to confine, within a proper sphere of action, a vast number of organs; it is, therefore, endowed with great resisting power.

The body is accordingly composed of an indefinite number of elastic and flexible rings more or less circular.

It is plain, that if an external force be

offered to a ring of this nature, it will yield and become contracted in its area. Allow this force a given power, sufficient to contract it one half; let it afterwards be applied internally with a view to dilate the ring, and it will scarcely produce the least effect: in consequence of a ring, exactly circular, being already in its utmost state of natural extension; therefore, if the ring be made to contract its area, it will be brought into a state of relaxation; but, if to enlarge it, into that of a high degree of tension.

The force employed in the former instance must exert its influence upon the convex surface of the ring, which will seldom offer much resistance, and the pressure between them will be correspondently slight.

But in the latter case, where the force is applied to the concave surface, in attempting to expand the ring, it will be resisted very powerfully, and the pressure between them will be very considerable.

Ulceration from within, accordingly appears to be governed by the five following laws, viz.

Two Mechanical.

1^{mo}. That a flexible and elastic cylinder will suffer a less degree of pressure under a compressing power applied to its external surface.

2^{do}. That this cylinder will sustain a greater degree of pressure from a dilating power applied to its internal surface.

And, Three pertaining to the Animal Economy.

1^{mo}. That moderate pressure will invigorate the action of the arterial vessels which deposite the component parts of the body, without augmenting the power of the absorbing vessels which remove them.

2^{do}. That great pressure will suspend the operation of the depository vessels, by its

mechanical obstruction to the circulation of the blood; while the lymphatics, from their diminutive size, will seldom sustain any impediment to their function from the same cause.

3^{tho}. That hard substances, as bone, tendon, ligament, &c. whenever involved in ulceration, will greatly accelerate that process through the soft parts; but to a considerable extent defend themselves.

It is suggested, that these are the laws which influence this description of ulceration, and that they will explain why its progress should be made almost invariably towards the external surface of the body: and take the shortest direction.

It is well known, that the figure which includes the greatest area is a circle. The limbs which approach the most towards perfect cylinders, will, for that reason, be the most inconvenienced by the derangement of

parts, necessarily occasioned by a foreign body occupying them: also, the most prone to ulcerate; and this disposition will be either inversely proportionate to the smallness of the cylinder, or will correspond with the magnitude of the tumor in relation to the size of the cylinder; hence a small leaden bullet will sometimes lodge in a large cylinder: as in the thigh, buttocks, or chest, without the power of becoming liberated by ulceration. On the contrary, the slightest tumefaction in a small compact cylinder, like the finger, immediately inflames and disposes it to ulcerate.

To explain further, in an instance of gunshot wounds. Let a ball enter at any part of the thigh, large enough to occasion ulceration, it will proceed in the shortest direction from it to the surface of the limb: and this disposition will be the stronger as it is lodged nearer the integuments, for these reasons.

The circumferential pressure of a limb tends towards its centre; then, if a ball be situated away from the centre of the thigh, its power of distension will produce the most relative derangement to the fewest parts which cover it: they will accordingly offer the greatest resistance; by their forming with the ball a perpendicular direction to the centre of the thigh, which circumstance occasions the hemisphere of the ball nighest the surface of the limb, to sustain a pressure greater than the other hemisphere, inversely, as the segment of the small sphere, formed by the soft parts over it: bears relation to the remaining large portion of the circle of the thigh.

Assuming this explanation to be correct, it will be evident, that the surface of the soft parts, in immediate contact with that half of the ball suffering the perpendicular pressure, would have its circulation of blood completely obstructed, by the forced collapse of its arte-

rial ramifications; while the absorbents would remove it and present a new surface to the ball, which would be subjected to the same operations, and each in succession would become removed in its order, till a passage was made through the skin. From the commencement of this process, there would be a less degree of pressure simultaneously produced between the remaining half of the ball, and the parts surrounding it: first occasioning adhesive inflammation, and consequent thickening of them, and then, a secretion of pus filling up the cavity as it is formed by absorption; so that, whether the pus, or the ball, at this stage of the ulceration, be in immediate contact with the routine of new surfaces, the pressure between them is equally great: and, as ulceration advances towards the integuments, from its nervous sensibility, it will not suffer much tension, without producing inflammation, which fills up its cellular

substance with coagulable lymph, while its oily contents become absorbed, and thus impedes the ulcerative process, although it ensures its ultimate pointing; at this stage, constitutional irritation comes on.

There appears to be one substantial proof of the blood-vessels being collapsed previous to their giving way, or becoming absorbed during ulceration: viz. that as every ramification would effuse a drop or two of blood as it became destroyed, there would not be an instance of an abscess, except between secreting membranes, wherein its contents were not highly tinged with blood, contrary to general experience.

It is a fair inference, that the vessels have their blood completely expressed by being collapsed, and, at the points, where this severe pressure terminates in a milder degree, adhesive inflammation and coagulum occur, sealing them up previous to their becoming

destroyed, thus preventing the escape of blood.

The circumstances connected with ulceration through the trunk of the body, differ from those of a limb, inasmuch as it is a large cylinder, and contains soft and yielding viscera; but the effect is the same. For instance, a hard substance formed between the peritoneum and the musculus transversus abdominis, will distend, by its bulk, all the parts around it: but, from its situation, cannot be resisted equally at its whole circumference, for reasons before assigned; viz. pressure on the convex surface of the peritoneum will not meet with much resistance, its contents are also of a yielding nature: therefore, the pressure between the tumor and the peritoneum will be only sufficient to invigorate the arterial vessels of this membrane to inflammatory action, and cause them to thicken it, there being no counteracting

power in the absorbents, which continue uniform in their function; while the distension of this tumor in the opposite direction, has a different tendency, being on the concave side of the transverse muscle, and the other parietes of the abdomen which offers great specific power of resistance, obstructing the circulation through the surface in immediate contact with the tumor: ulceration accordingly proceeds agreeably to that in liberating a ball from the thigh.

Precisely in this manner, would an abscess, situated between the pleura pulmonalis and pleura costalis, make its way to the external surface of the chest. The inner side of one or two of the ribs might become denuded, by the pressure they must suffer from being unyielding, and caries commence; yet, in general, before much injury can be done to them, ulceration has proceeded through the intercostal muscles and integuments, when

the ribs are relieved of this pressure and soon become repaired.

From the peculiar mechanism of a small solid cylinder, like the finger or toe, the slightest cause will give rise to inflammation, and ulceration will as promptly succeed, from the great specific power a small ring has to resist any dilating force. The finger has a large proportion of integuments, and of a more dense property than that in most other parts of the body; it is liberally supplied with nervous filaments; also, the contents of its cavity are unyielding. From such a conformation, an abscess, situated within, must occasion ulceration in every direction. It is seldom that it will make much progress into the bone, especially when a communication takes place with the theca of one of the tendons, which circumstance will greatly relieve it, till that passage becomes filled with pus, ulceration then proceeds slowly through the

fleshy cylinder. As whitlows occur more frequently among laboring people, whose work renders the whole substance of the fingers extremely dense, particularly the skin : these persons are more liable to have the bone become carious, and require amputation of the member.

Steatomatous tumours are less able than any others to produce ulceration, their growth being exceedingly tardy, and unattended with inflammation. Although they may be situated as other swellings, between convex and concave surfaces, they neither cause a thickening of the one, nor absorption of the other, from the insensible degrees of their enlargement; they do not press the surrounding parts sufficiently to stimulate them to inflammatory action: much less to obstruct their circulation. The same circumstance frequently attends the morbid growth of glands; but when, from any cause, suppuration of

these tumors commence, the more rapid augmentation of their size becomes sensible to the contiguous parts, and stimulates them to adhesive inflammation; when ulceration proceeds under the laws peculiar to the situation of these tumors, as before suggested.